RaySensor
Yichang RaySensor Optoelectronic Technology Co., Ltd.

RaySensing

Other Instruments & Optoelectronic Devices

English Product Brochure

Complementary FBG interrogators, point sensors, functional sensors and custom optoelectronic modules.

FBG Interrogators | Point Sensors | Custom Modules | Optical Components

PRODUCT FAMILY	MODELS	VERSION	YEAR
RS-HGFBG / RS-OPSEN	01-02 | S/T/D/A Series	V2.0 English Layout	2025

ENGLISH TRANSLATION + PRODUCT BROCHURE

Other Instruments & Optoelectronic Devices

Translated and redesigned from the source Chinese product files for international technical communication.

TECHNOLOGY PLATFORM Strong-FBG and ultra-weak FBG instruments, point sensors and optoelectronic modules for distributed and quasi-distributed sensing systems.	**MEASUREMENT TARGETS** Temperature, strain, displacement, acceleration, pressure, pore pressure and other physical parameters.	**APPLICATION DOMAINS** Power, tunnels, pipelines, petrochemical facilities, bridges, structural health monitoring and custom sensing systems.
CUSTOMIZATION Sensor package, interface, software protocol, optical module, mechanical chassis and secondary development can be configured.	**SYSTEM INTEGRATION** Products can supplement weak-grating cable networks or be integrated into custom FBG/DAS sensing instruments.	**DOCUMENT SCOPE** This brochure covers English principles, applications and specifications for interrogators, point sensors, functional sensors and optoelectronic sub-modules.

DOCUMENT INFORMATION

Version	Change summary	Prepared by	Date
V1.0	Initial release	Luo Zhihui	2022.04.21
V2.0	Content update	Wang Huilan	2025.03.31

Company: Yichang RaySensor Optoelectronic Technology Co., Ltd.

PORTFOLIO

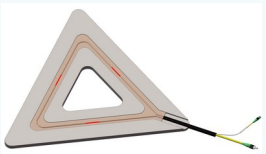
Product Family Overview

A concise map of the product platform and application direction.

Model / section	English product name	Core target	Form factor	Typical application focus
RS-HGFBG-01	Handheld FBG Interrogator	FBG signal analysis	Portable handheld	Field test and troubleshooting
RS-HGFBG-02	Rack-Mount FBG Interrogator	FBG temperature monitoring	Rack instrument	Online monitoring and explosion-proof sites
RS-OPSEN-S1	Point Strain Sensor	Local strain	Welded / bonded sensor	Steel and concrete surface strain
RS-OPSEN-S2	Strain Rosette Sensor	Strain direction / principal stress	Three-grating rosette	Vector mechanical measurement
RS-OPSEN-D1	Displacement Sensor	Relative displacement	Stainless-steel sensor	Joint gap, dam and slope displacement
RS-OPSEN-A1	Acceleration Sensor	Vibration / acceleration	Optical acceleration sensor	Intrinsic safety and high voltage sites
RS-OPSEN-T1	Single-Point Temperature Sensor	Local temperature	Metal packaged sensor	Temperature reference and compensation
6.5	Other Functional Sensors	Custom physical parameters	Functional sensor portfolio	Flexible distributed/quasi-distributed networks
6.6	Optoelectronic Sub-Modules	Custom optical systems	EDFA/SOA/components	Instrument integration and software development

PRODUCT VISUALS



RS-HGFBG-01

Handheld FBG Interrogator

Portable high-performance FBG demodulation device

OPERATING PRINCIPLE

RS-HGFBG-01 is a high-performance portable device for strong FBG signal analysis and demodulation, suitable for field testing and troubleshooting. Its reflection enhancement design supports high-precision reflective signal demodulation and real-time monitoring of fiber Bragg grating sensor outputs. It supports structural health monitoring, power temperature monitoring and other demanding applications.

TYPICAL APPLICATIONS

- Surface temperature monitoring in tunnels and similar structures
- Oil-pipe temperature monitoring
- Temperature reference for distributed weak-grating sensing cables

TECHNICAL SPECIFICATIONS

arameter	Typical specification
Center wavelength	1525 nm to 1565 nm
Wavelength resolution	+/- 1 pm
Wavelength repeatability	+/- 1 pm
Wavelength accuracy	+/- 3 pm
Channels	16 channels
Grating points per channel	<= 19
Sampling frequency	<= 10 Hz
Synchronization	Synchronous channel acquisition
Operating temperature range	-20 °C to 55 °C
Installation	Handheld; no computer connection required
Interface	Wi-Fi
Storage	SD card
Data output	Spectrum / wavelength / measured value (strain, temperature)
Output protocol	Custom TCP protocol
Fiber interface	MPO, 16 channels
Voltage	DC 5 V
Power consumption	12 W
Battery module	Included
LCD screen	Included

RS-HGFBG-02

Rack-Mount FBG Interrogator

Rack-mount FBG sensing and detection system

OPERATING PRINCIPLE

RS-HGFBG-02 is a sensing and detection system based on fiber Bragg grating technology. It can measure temperature at target locations and consists of an FBG temperature measurement host, grating sensors and transmission cable. The system supports serial-parallel applications and can be used in petrochemical and other high explosion-proof-requirement sites. The instrument response time is 2 s and system response time is within 10 s. Core components provide side-mode suppression greater than 60 dB, supporting high accuracy, short response time, electromagnetic immunity and explosion-proof applications.

TYPICAL APPLICATIONS

- Temperature monitoring of high-voltage switchgear
- Online temperature monitoring of oil tanks
- Online structural health monitoring for bridges, tunnels and mountains

TECHNICAL SPECIFICATIONS

arameter	Typical specification
Center wavelength	1528 nm to 1568 nm
Wavelength resolution	+/- 1 pm
Wavelength accuracy	+/- 3 pm
Channels	16 channels, customizable
Grating points per channel	<= 19
Scan frequency	1 Hz to 100 Hz
Fiber interface	FC/APC standard optical fiber
Remote monitoring distance	40 km
LCD display	8.4 inch
Ambient operating range	-15 °C to 55 °C
Instrument working temperature	0 °C to 40 °C
Communication interfaces	10/100M Ethernet, RS232, USB
Dimensions (W x H x D)	480 mm x 90 mm x 380 mm, customizable
Software	Windows-based software; standard MODBUS protocol; DLL or custom software protocol available

RS-OPSEN-S1

Point Strain Sensor

Low-temperature-sensitivity ultra-weak FBG strain sensor

OPERATING PRINCIPLE

RS-OPSEN-S1 is a high-precision steel-surface strain sensor with low temperature sensitivity. Compared with other strain gauges, its temperature coefficient is reduced by more than 50%. A built-in temperature sensor supports temperature compensation correction, improving measurement accuracy. It can also be used as a temperature sensor.

TYPICAL APPLICATIONS

- Surface strain monitoring for steel structures
- Surface strain monitoring for concrete structures
- Supplemental local monitoring for distributed weak-grating sensing cables

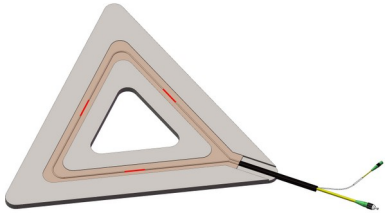
TECHNICAL SPECIFICATIONS

arameter	Typical specification
Center wavelength	1528 nm to 1568 nm
Center wavelength tolerance	+/- 0.5 nm
Grating length	10 mm
Reflectivity	0.01% to 0.1% weak grating
Bandwidth @ -3 dB	<= 0.50 nm
Side-mode suppression ratio	>= 15 dB
Sensor loss	<= 0.5 dB
Strain range	+/- 1000 microstrain
Strain sensitivity	1.7 pm/microstrain
Accuracy	3 ‰ F.S.
Dimensions	Φ8 mm x 110 mm
Temperature accuracy	1 °C
Installation	Base welding or adhesive locking
Operating temperature	-20 °C to 80 °C

RS-OPSEN-S2

Strain Rosette Sensor

Three-grating ultra-weak FBG vector strain sensor



OPERATING PRINCIPLE

RS-OPSEN-S2 packages three ultra-weak FBGs on a specially designed stainless-steel substrate at 60° relative angles. After spot welding, the sensor couples tightly to the structure and accurately measures strain magnitude and direction, enabling principal-stress analysis and vector mechanical measurement on complex structures.

TYPICAL APPLICATIONS

- Monitoring strain magnitude and direction on steel structures
- Local supplemental monitoring for distributed weak-grating sensing cables

TECHNICAL SPECIFICATIONS

arameter	Typical specification
Center wavelength	1528 nm to 1568 nm
Center wavelength tolerance	+/- 0.5 nm
Grating length	10 mm
Reflectivity	0.01% to 0.1%
Bandwidth @ -3 dB	<= 0.50 nm
Side-mode suppression ratio	>= 15 dB
Sensor loss	<= 0.5 dB
Strain range	+/- 2000 microstrain
Principal compressive strain error	<= 5%
Principal compressive angle error	<= 0.58%
Principal tensile strain error	<= 3.5%
Principal tensile angle error	<= 0.1%
Dimensions	60 mm x 2 mm
Installation	Spot welding
Operating temperature	-20 °C to 80 °C

RS-OPSEN-D1

Displacement Sensor

FBG displacement sensor for relative displacement measurement

OPERATING PRINCIPLE

RS-OPSEN-D1 is an FBG displacement sensor used to measure relative displacement between structures. During installation, the sensor and probe are fixed to the moving object and reference object respectively. It supports long-term and short-term monitoring and can be reused. With high accuracy, high sensitivity and long service life, it can be combined with other FBG sensors to form an all-optical monitoring network.

TYPICAL APPLICATIONS

- Joint gap measurement
- Dam body displacement monitoring
- Soil settlement, rock, mountain and slope monitoring
- Local supplemental monitoring for distributed weak-grating sensing cables

TECHNICAL SPECIFICATIONS

arameter	Typical specification
Grating center wavelength	1525 nm to 1565 nm
Grating reflectivity	> 0.1%
Standard range	100 mm to 500 mm, customizable
Measurement accuracy	0.3% F.S.
Resolution	< 0.1 mm
Temperature compensation	Self-compensated
Package	Stainless steel
Installation	Bolt fastening
Pigtail type	Armored cable
Connection	Splicing or FC/APC
Dimensions (W x L)	65 x 65 mm, range-dependent

RS-OPSEN-A1

Acceleration Sensor

Optical acceleration sensor for vibration and frequency testing

OPERATING PRINCIPLE

RS-OPSEN-A1 acceleration sensor can be used for frequency testing in multiple scenarios. It provides good low-frequency response and good sensitivity consistency at high frequencies. The sensor is reusable, supports all-optical networking, is intrinsically safe, resists electromagnetic interference and lightning, and provides robust, high-temperature, high-insulation performance. Vertical/horizontal mounting and dual-ended fiber output simplify networking.

TYPICAL APPLICATIONS

- Intrinsic safety applications in hazardous detection environments
- Electrical insulation applications in high-voltage scenarios

TECHNICAL SPECIFICATIONS

arameter	Typical specification
Center wavelength	1527 nm to 1567 nm
Range	+/- 10 g
Frequency response	4 Hz to 2000 Hz
Operating temperature range	-30 °C to 80 °C
Dimensions	65 x 56 x 30 mm
Mounting hole spacing	50 x 50 mm (M4)
Connector	FC/APC or splicing
Pigtail	Armored cable or standard optical cable

RS-OPSEN-T1

Single-Point Temperature Sensor

Metal-packaged FBG temperature sensor

OPERATING PRINCIPLE

RS-OPSEN-T1 is a metal-packaged temperature sensor that can be networked by connecting multiple sensors in series. It offers small size, high sensitivity, good stability, low damage risk and immunity to electromagnetic interference. It can be used for tunnel fire protection, oil-pipe temperature measurement and temperature compensation.

TYPICAL APPLICATIONS

- Surface temperature monitoring in tunnels and similar structures
- Oil-pipe temperature monitoring
- Temperature reference for distributed weak-grating sensing cables

TECHNICAL SPECIFICATIONS

arameter	Typical specification
Center wavelength	1528 nm to 1568 nm
Center wavelength tolerance	+/- 0.5 nm
Grating length	10 mm
Reflectivity	0.01% to 0.1%
Bandwidth @ -3 dB	<= 0.50 nm
Side-mode suppression ratio	>= 15 dB
Sensor loss	<= 0.5 dB
Accuracy	+/- 0.5 °C F.S.
Dimensions	Φ8 mm x 60 mm
Installation	Adhesive bonding
Operating temperature	-20 °C to 150 °C
Fiber output	3 mm armored cable

6.5

Other Functional Sensors

Ultra-weak FBG functional sensors for distributed and quasi-distributed networks

PLATFORM DESCRIPTION

Ultra-weak FBG functional sensors extend the application scope of ultra-weak grating systems and supplement distributed sensing cables. Considering the need for dual-ended fiber output when weak gratings are connected in series, traditional FBG functional-sensor mechanics can be optimized by replacing the FBG unit with an ultra-weak FBG sensing unit. After curing, calibration and testing, point sensors for strain, temperature, displacement and other parameters can replace conventional FBG sensors and connect directly to ultra-weak FBG interrogators.

AVAILABLE CONFIGURATIONS

- Ultra-weak FBG displacement sensor
- Ultra-weak FBG pore pressure sensor
- Ultra-weak FBG hydrostatic level gauge: 200 mm range, 0.5 mm accuracy
- Other functional sensors such as rebar meters, tension meters and angle meters

REPRESENTATIVE VISUALS

6.6

Custom Optoelectronic Sensing Sub-Modules

Custom sensing systems, DAS systems, optical modules and software interfaces

PLATFORM DESCRIPTION

RaySensor can provide custom optoelectronic sensing system development based on its FBG demodulation and DAS technology platforms. Typical developments include compact FBG demodulation modules, ultra-weak FBG strain sensing systems, deformation sensing systems, DAS acceleration systems, long-distance DAS systems and downhole ultrasonic imaging systems. Optical module integration and instrument software development are also available.

AVAILABLE CONFIGURATIONS

- Custom FBG systems: long-distance ultra-weak FBG sensing systems, 0.1 m-resolution shape sensing systems, compact 110 mm x 45 mm x 20 mm FBG demodulation modules
- Custom weak-grating DAS systems: point-array DAS acceleration systems, meter-level-resolution sensing systems and 50 km-class long-distance ultra-weak FBG DAS systems
- Optoelectronic modules: custom pulsed fiber amplifiers (EDFA), SOA optical modulation modules (10 ns), optical switches, circulators and attenuators
- Integration services: optical module integration, portable chassis and instrument design, LabVIEW wavelength-demodulation UI development and C# instrument software development

REPRESENTATIVE VISUALS

RaySensor

Ultra-Weak FBG Sensing Platform

Complementary Instruments and Sensor Modules

RaySensor provides handheld and rack-mount FBG interrogators, point sensors and custom optoelectronic sub-modules to extend distributed ultra-weak FBG sensing systems.

FBG INTERROGATORS

Handheld and rack-mount platforms for field testing, temperature monitoring and system diagnostics.

POINT SENSORS

Strain, displacement, acceleration and temperature sensors for local supplemental measurement.

FUNCTIONAL SENSORS

Customizable ultra-weak FBG functional sensors for quasi-distributed networks.

OPTICAL MODULES

EDFA, SOA modulation, switches, circulators, attenuators and instrument integration services.

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English product brochure | Specifications are subject to project configuration and final quotation.

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